Usability, Ergonomics, and Educational Value of a Novel Remote Telestration and Augmented Reality Device for Surgical Coaching

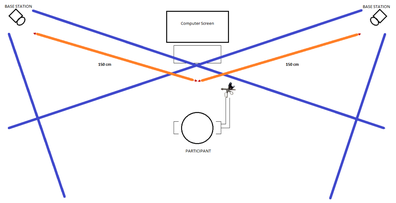
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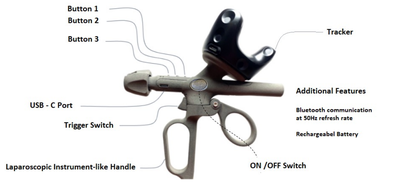
INTRODUCTION

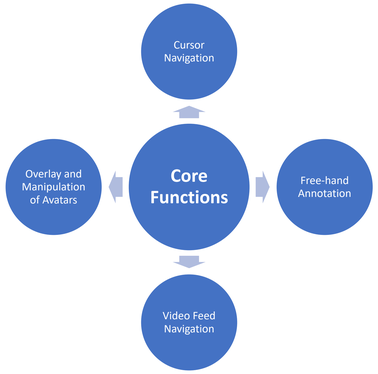
- To augment the coaching experience, a prototype wireless handheld telestration device was developed, enabling interaction with the surgical field on a remote monitor.
- This study evaluates the tool's usability, ergonomics and educational value.

METHODS

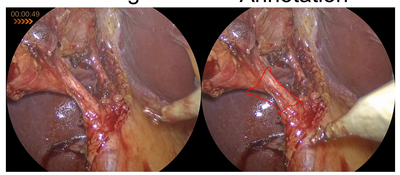
Telestration Device and Set-up



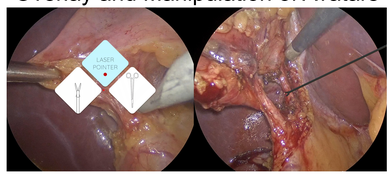




Video Navigation Annotation



Overlay and Manipulation of Avatars



Assessment

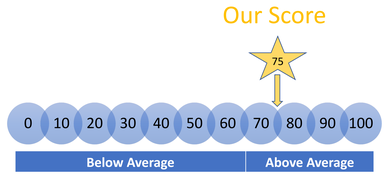
1) **Usability Testing:** users were asked to perform various tasks to assess the functions of the tool
   - App launch and calibration
   - Play/pause and fast-forward/rewind video feed
   - Instrument selection
   - Open/close and rotate grasper tip
   - Annotation and erase annotation
2) **Post-Usability Test Survey:** 5-point Likert Scale and a validated System Usability Scale (SUS)[1]

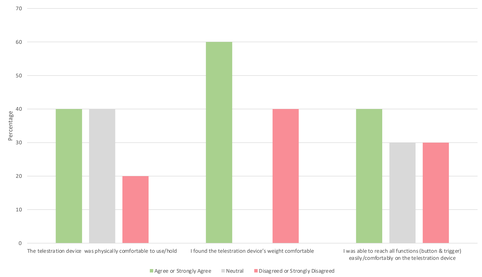
RESULTS

Ten subjects (9 surgeons, 1 trainee; 5 male, 5 female) participated. Average age was 36.4 years.

Ergonomics

A SUS score above 68 indicates above average usability.





- 40% agreed that the device was physically comfortable to use and hold
- 60% agreed the weight was comfortable

Tasks

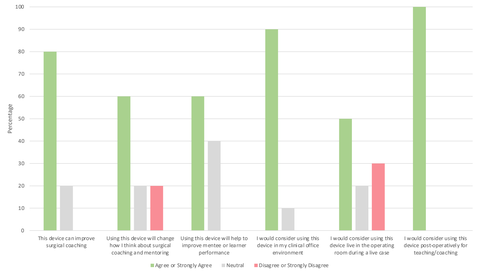
Majority of Participants:

- 60% disagreed that launching and calibrating was easy
- 90% agreed that fast-forwarding and rewinding, and annotating were easy
- 100% agreed that erasing annotations was easy

Function	Agree or Strongly agree	Neutral	Disagree or Strongly disagree
Standard Tasks			
App Launch and Device Calibration	30%	10%	60%
Play/Pause Video Feed	80%	20%	0%
Video Feed Navigation			
Fast Forward and Rewind	90%	10%	0%
Overlaying and Manipulation of Ghost Instrument			
Menu- Instrument Selection	70%	30%	0%
Rotate Grasper Tip	40%	50%	10%
Open and Close Grasper Tip	70%	20%	10%
Freehand Annotation			
Annotation	90%	0%	10%
Erase Annotation	100%	0%	0%

Potential Educational Value

- 100% agreed that they would use this device for post-operative coaching
- 50% agreed that they would use the device in the OR



CONCLUSION

- Preliminary testing of a wireless telestration and AR device customized for surgical coaching suggests favorable usability and potential educational value amongst users.

References

1. Department of Health and Human Services. (n.d.). System Usability Scale (SUS) | Usability.gov. https://www.usability.gov/how-to-and-tools/methods/system-usability-scale.html

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